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PATENT SPECIFICATION

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CLASS 63: SADDLERY AND COACHMAKING

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Device on bicycles for reducing shock effects

Patented in the German Empire from December 19, 1890 on.

In the bicycles in use up to this point, achieving a reduction or cancellation of the shaking arising during travel has been attempted in that the front wheel or the steering wheel is elastically mounted and the seat is also provided with springs or the like. Although these devices fulfill their purpose on good pavement, they are inadequate for travel on poor pavement or uneven ground.

The present invention, which is illustrated in Figures 1 through 14 of the attached drawing, is to allow travel without shock and shaking even on very poor pavement. The construction of the device is as follows:

The crankshaft H, on whose sides the cranks I and N are located, rests in a bearing A, which is shown in horizontal section in Figure 1 and in a lateral view in Figure 2. Both sides of the bearing A contain round depressions e e^1, in which capsules f f^2, one of which is shown Figure 10, are to be inserted; the purpose of these capsules is to be explained later.

In addition, two diametrically running arms B D and C E are located on each end of the bearing A. The arms B C of one side unite to form a bow, which is identified in Figure 12 and Figure 14 by G^1. An opening h is located at the end of this bow, in which a coiled spring R, Figure 14, may be attached in such a way that its tension may be regulated as needed by a threaded bolt i. The other end of the coiled spring R is attached to a transverse arm S of the bicycle, Figure 14, or to another suitable part. The purpose of this spring will be explained in the following.

The arms D and E opposite the arms B and C of the bearing A, Figure 1, enclose the axle of the drive wheel at their end and are connected thereto in an arbitrary way. The bearing A is provided with a housing F, Figure 9, which comprises two halves F, Figure 3, each half of which is provided with four projections, in which holes a, a', a", a'" are located, so that the two halves may be connected to form a closed housing through fitting bolts.

One half of the housing F carries an arm F^1, Figure 4, which extends upward and is directly connected to the seat of the bicycle by a rod Q, Figure 14: the housing F is turned out conically at the sides b b and encloses the also conically shaped parts b^1 of the bearing A here, as may be seen from Figure 9. In order to reduce the friction of the housing F on the bearing as much as possible, ball bearings may be attached either between b and b^1 or also directly between the inner faces of F and A, as is indicated in Figure 1 by dotted lines, for example. A chainwheel J is permanently connected to the crankshaft H, which in turn transmits the movement granted thereto by the crank to a smaller chain wheel attached to the drive wheel axle.

Since the seat of the bicycle is permanently connected to the housing F, but this housing may rotate on the bearing A, it results that the weight of the rider must be compensated for by the tension of the coiled spring R. However, any shock which the steering wheel or the drive wheel receives due to any obstruction is also compensated for by the coiled spring R, so that the rider will not feel anything at all of the shock, particularly if the handlebars are also spring mounted. The rear part of the bicycle may more or less oscillate around the crankshaft H.

This arrangement may be altered in various ways and the most important alterations are described in the following.

In the bearing A illustrated in Figure 5, the sides e e^1 are shaped precisely as in Figure 1 and are also equipped with capsules f^1, Figure 10. The arms B and C are shifted inward somewhat and are united in the same way to form a bow, as is shown in Figure 12. The outer lateral ends of the bearing A are provided with a V-shaped groove c, on which rings may be placed. These rings G comprise two parts, of which Figure 7 shows one part in an interior view and Figure 8 shows the other part in a side view. These half rings are provided with projections in which holes d d^1 are located, so that both halves may be screwed together to form a ring through fitting bolts. The inner surface of the ring G is also shaped conically, so that the part c^1, Figures 7 and 8, fits precisely in the groove c.

These rings are used for replacing the housing F illustrated in Figure 3, and two rings G must be used for a housing F, since the rings are not located within the arms B and C, but rather outside. An arm G^1 is located on each of the rings G; the two arms of the rings are combined to form a rod Q, Figure 14, to which the seat of the bicycle is attached.

The bearing A, as illustrated in Figure 5 in horizontal section and Figure 6 in a side view, has, instead of the arms D and E, as are used in Figure 1, only one arm D which subsequently forks, so that the drive wheel may be located in this fork; the ends of the fork are used for holding the drive wheel axle, of course. Of course, the one arm D may also be replaced by two arms with this mounting, as was already described in Figure 1.

Figure 11 shows how such a drive device is assembled, and the purpose of the capsules f f^1 will also become completely clear from this.

After the crank I is permanently connected to the crankshaft H, the chainwheel J is put on and also permanently connected to the shaft; it is followed by a metal part K, which is provided on one side with a groove which is directly diametrically opposite the inner curve of the capsules f, so that a number of small balls g may be located in this groove, a ball bearing thus being formed. After the bearing A has now been put on, the other side thereof is also provided with a ball bearing g^1 using a metal part L similar to the metal part K. At this point, the shaft H is provided with a thread, so that the metal part L may be screwed on, its secure hold is also increased by two nuts M; the end of the shaft H is then finally provided with the other crank N. The rings G are now inserted into the conical grooves, Figures 5, 7, and 8. Instead of the groove c and the cut c^1, a ball bearing may also be used, through which the form of the above-mentioned parts becomes unnecessary, of course; the bearing A is now thus connected on one side to the coiled spring R and on the other side to the drive wheel axle and the rings G are connected to the seat by their arms G^1 through mediation of the rod Q, as was already described above.

A second alteration of the device described above is illustrated in Figure 12, in which the bearing A, Figures 1 and 5, has been dispensed with entirely; the crankshaft H is provided with four rings O O^1 P P^1 here, which are fixed thereto and are provided with a semicircular groove around their circumference. A ring G, Figures 7 and 8, may be moved on each of the rings O through P^1, and the rings which are on the rings O^1 and P are completely identical to those illustrated in Figures 7 and 8, except for the ball bearing unit, while the other two rings are not provided with one arm G^1, but rather with two arms, so that the arms G^1 located on one side fulfill the same purpose as the arms B and C of the bearings in Figure 1 and 5, while the other arms G^n, Figure 12, replace the arms D and E of the bearing of Figures 1 and 5.

The rings located on the rings O^1 and P are identified in Figure 2 by G^m, otherwise, the mode of operation of this system is precisely the same as described above.

Figure 13 shows another special side view of the ring G situated on the ring O having its arms G and G^n.

The device may finally be designed even more simply and cheaply if the rings O through P^1 are dispensed with entirely and the grooves for the ball bearings n n

are introduced directly into the crankshaft H; however, this is generally only applicable for small bicycles, since the safety of the crankshaft H is thus impaired.

In special cases, the one coiled spring R, Figure 14, may also be supported by a second R^1, which then must receive a position as is shown in Figure 14 by a dotted line. Accordingly, coiled spring R is subjected to tensile stress and coiled spring R^1 is subjected to compression stress, and it is therefore expedient to enclose the coiled spring R^1 in two metal sleeves, which may be pushed one into another telescopically, so that bending of the coiled spring, i.e., deflection from the linear direction, cannot occur. Figure 14 additionally shows in dotted lines which position the drive wheel and the arms G^1 and G" must assume after the rider has climbed on the bicycle. It is no longer to be necessary with the arrangements described above to mount the seat elastically, since all shocks are to be absorbed by the coiled springs R or R^1.

Patent Claims

1. A device on bicycles for reducing the shock effects, characterized by the pedal crank axle bearing A, provided with radial arms B C D E, whose arms D E hold the axle of the rear wheel or the rear wheels and whose arms B C are carried by one or more coiled springs of the frame S, in connection with a housing F enclosing the bearing A, which is permanently connected to the seat post Q and supports this in addition to seat and bicycle rider, and whose weight is transmitted to the coiled spring R through mediation of the bearing A and the arms B C, so that housing F oscillates around the bearing A upon each shock affecting the front wheel, while the latter oscillates within the housing F upon each shock affecting the rear wheel, so that all shocks affecting the bicycle are compensated for by the coiled spring.

2. In the device protected under Claim 1, the replacement of the housing F by two rings G, which are situated on the bearing A inside or outside the arms of the latter and are connected to the seat post Q in the way characterized in Claim 1.

3. In the device protected under Claim 1, the replacement of the bearing A by two rings O P^1 which are enclosed by rings G, on which the arms B C D E or G^1 G" are seated.

1 page of figures appended

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